CLAIMS

1.  A printer for performing correction to improve the quality of images represented by input binary black and for printing the images,

5  comprising an image-quality corrector unit for detecting second irregular patterns that are represented by data included in the input black and white pixel data and that are specific to an error-variance method, wherein said image-quality

10  corrector unit detects at least one type of substantially vertical vertical-line irregular patterns, substantially horizontal horizontal-line irregular patterns, and thin-line patchy patterns to thereby smooth the detected second irregular

15  patterns.

2.  The printer according to claim 1, wherein said image-quality corrector unit sequentially inputs the black and white pixel data representing groups of an attention pixel and a plurality of

20  peripheral pixels, and compares the input data to the irregular patterns registered; and when pattern-matching is detected, said image-quality corrector unit performs area gradation correction for converting an area at a predetermined position

25  in an n-divisional pixel (n = natural number) of the attention pixel and a predetermined number of intrapixel divisional areas to black areas.

3. A printer for performing correction to improve the quality of images represented by input binary black and for printing the images, comprising an image-quality corrector unit for detecting isolated pixels that are specific to error-variance method and that are represented by data included in the input black and white pixel data and for distributing the detected isolated pixel to peripheral pixels to thereby reduce the pixel size.

4. The printer according to claim 3, wherein said image-quality corrector unit comprises a plurality of matrix patterns having different sizes, uses the matrix patterns in the order of larger sizes to detect isolated pixels, and distributes the isolated pixels to peripheral pixels according to the sizes of the matrix patterns used to detect the isolated pixels.

5. The printer according to claim 4, wherein said image-quality corrector unit allows the number of distributed peripheral pixels to be increased in proportion to the increase in the size of the matrix pattern used to detect an isolated pixel, and concurrently, allows the size of a reduced distribution pixel to be reduced in inverse proportion thereto.

6. The printer according to claim 3, wherein

said image-quality corrector unit uniformly
distributes reduced pixels obtained through
reduction in the size of the detected isolated
pixel to peripheral pixels in a plurality of

5    directions.

7.   A printer for performing correction to
improve the quality of images represented by input
binary black and for printing the images,
comprising:

10       a first image-quality corrector unit for
detecting first irregular patterns that are
represented by data included in the black and white
pixel data and that are specific to binary
processing (binary coding) according to a method

15   other than an error-variance method to thereby
smooth the detected first irregular patterns;

a second image-quality corrector unit for
detecting second irregular patterns that are
represented by data included in the input black and

20   white pixel data and that are specific to an error-
variance method, wherein said image-quality
corrector unit detects at least one type of
substantially vertical vertical-line irregular
patterns, substantially horizontal horizontal-line

25   irregular patterns, and thin-line patchy patterns
to thereby smooth the detected second irregular
patterns; and

a controller unit for operating such that the black and white pixel data input to said first image-quality corrector unit is input to said second image-quality corrector unit to be processed

5    thereby when the black and white pixel data does not match one of the first irregularity detection patterns, and said first image-quality corrector unit is used to process the input black and white pixel data by interrupting processing being

10   performed by said second image-quality corrector unit when the black and white pixel data matches one of the first irregularity detection patterns.

    8.   The printer according to claim 7, wherein said first image-quality corrector unit and said

15   second image-quality corrector unit sequentially input the black and white pixel data representing groups of an attention pixel and a plurality of peripheral pixels, and compares the input data to the first irregular patterns and the second

20   irregularity detection patterns; and when pattern-matching is detected, said first image-quality corrector unit and said second image-quality corrector unit perform area gradation correction for converting an area at a predetermined position

25   in an n-divisional pixel (n = natural number) of the attention pixel and a predetermined number of intrapixel divisional areas to black areas.

9.  The printer according to claim 7, further comprising a third image-quality corrector unit for detecting isolated pixels that are specific to the error-variance method and that are represented by

5   data included in the input black and white pixel data and for distributing the detected isolated pixel to peripheral pixels to thereby reduce the pixel size.

10.  The printer according to claim 7,

10  wherein said first image-quality corrector unit comprises a plurality of matrix patterns having different sizes, uses the matrix patterns in the order of larger sizes to detect isolated pixels, and distributes the isolated pixels to peripheral

15  pixels according to the sizes of the matrix patterns used to detect the isolated pixels.

11.  The printer according to claim 10, wherein said first image-quality corrector unit allows the number of distributed peripheral pixels

20  to be increased in proportion to the increase in the size of the matrix pattern used to detect an isolated pixel, and concurrently, allows the size of a reduced distribution pixel to be reduced in inverse proportion thereto.

25  12.  The printer as according to claim 7, wherein said image-quality corrector unit uniformly distributes reduced pixels obtained through

reduction in the size of the detected isolated
pixel to peripheral pixels in a plurality of
directions.

13. The printer according to claim 7,
5   wherein said controller unit operates such that the
black and white pixel data input to said first
image-quality corrector unit is input to said
second image-quality corrector unit and
subsequently to said third image-quality corrector
10   unit to be processed thereby when the black and
white pixel data does not match one of the first
irregularity detection patterns, and said first
image-quality corrector unit is used to process the
input black and white pixel data by interrupting
15   processing being performed by said second image-
quality corrector unit and processing being
processed by said third image-quality corrector
unit when the black and white pixel data matches
one of the first irregularity detection patterns.

20      14. A printer for performing correction to
improve the quality of images represented by input
binary black and for printing the images,
comprising:

    a first image-quality corrector unit for
25   detecting first irregular patterns that are
represented by data included in the black and white
pixel data and that are specific to a method other

than an error-variance method to thereby smooth the
detected first irregular patterns;

a third image-quality corrector unit for
detecting isolated pixels that are represented by
5   data included in the input black and white pixel
data and for distributing the detected isolated
pixel to peripheral pixels to thereby reduce the
pixel size; and

a controller unit for operating such that the
10  black and white pixel data input to said first
image-quality corrector unit is input to said third
image-quality corrector unit to be processed
thereby when the black and white pixel data does
not match one of the first irregularity detection
15  patterns, and said first image-quality corrector
unit is used to process the input black and white
pixel data by interrupting processing being
performed by said third image-quality corrector
unit when the black and white pixel data matches
20  one of the first irregularity detection patterns.

15.  A printing method for performing
correction to improve the quality of images
represented by input binary black and for printing
the images, wherein detection is performed for
25  second irregular patterns that are represented by
data included in the input black and white pixel
data and that are specific to an error-variance

method such that detection is performed for at
least one type of substantially vertical vertical-
line irregular patterns, substantially horizontal
horizontal-line irregular patterns, and thin-line
5    patchy patterns to thereby smooth the detected
second irregular patterns.

　　16.　A printing method for performing
correction to improve the quality of images
represented by input binary black and for printing
10   the images, wherein detection is performed for
isolated pixels that are specific to error-variance
method and that are represented by data included in
the input black and white pixel data and for
distributing the detected isolated pixel to
15   peripheral pixels to thereby reduce the pixel size.

　　17.　A printing method for performing
correction to improve the quality of images
represented by input binary black and for printing
the images, comprising:

20   　　a first image-quality correction step for
detecting first irregular patterns that are
represented by data included in the black and white
pixel data and that are specific to binary
processing (binary coding) according to a method
25   other than an error-variance method to thereby
smooth the detected first irregular patterns;

　　　a second image-quality correction step for

detecting second irregular patterns that are
represented by data included in the input black and
white pixel data and that are specific to an error-
variance method, wherein said image-quality
5    correction step detects at least one type of
substantially vertical vertical-line irregular
patterns, substantially horizontal horizontal-line
irregular patterns, and thin-line patchy patterns
to thereby smooth the detected second irregular
10   patterns; and

a control step for operating such that the
black and white pixel data input to said first
image-quality correction step is input to said
second image-quality correction step to be
15   processed thereby when the black and white pixel
data does not match one of the first irregularity
detection patterns, and said first image-quality
correction step is used to process the input black
and white pixel data by interrupting processing
20   being performed in said second image-quality
correction step when the black and white pixel data
matches one of the first irregularity detection
patterns.

18.   A printing method for performing
25   correction to improve the quality of images
represented by input binary black and for printing
the images, comprising:

a first image-quality correction step for
detecting first irregular patterns that are
represented by data included in the black and white
pixel data and that are specific to a method other
5    than an error-variance method to thereby smooth the
detected first irregular patterns;

a second image-quality correction step for
detecting second irregular patterns that are
represented by data included in the input black and
10   white pixel data and that are specific to an error-
variance method, wherein said image-quality
correction step detects at least one type of
substantially vertical vertical-line irregular
patterns, substantially horizontal horizontal-line
15   irregular patterns, and thin-line patchy patterns
to thereby smooth the detected second irregular
patterns;

a third image-quality correction step for
detecting isolated pixels that are represented by
20   data included in the input black and white pixel
data and for distributing the detected isolated
pixel to peripheral pixels to thereby reduce the
pixel size; and

a control step for operating such that the
25   black and white pixel data input to said first
image-quality correction step is input to said
third image-quality correction step to be processed

therein when the black and white pixel data does
not match one of the first irregularity detection
patterns, and said first image-quality correction
step is used to process the input black and white
5      pixel data by interrupting processing being
performed in said second image-quality correction
step and said third image-quality correction step
when the black and white pixel data matches one of
the first irregularity detection patterns.

10         19.  A printing method for performing
correction to improve the quality of images
represented by input binary black and for printing
the images, comprising:

        an image-quality correction step for
15   detecting irregular patterns that are represented
by data included in the black and white pixel data
and that are specific to a method other than an
error-variance method to thereby smooth the
detected irregular patterns;

20         a pixel-distribution step for detecting
isolated pixels that are represented by data
included in the input black and white pixel data
and for distributing the detected isolated pixel to
peripheral pixels to thereby reduce the pixel size;
25   and

        a control step for operating such that the
black and white pixel data input to said image-

quality correction step is input to said pixel-
distribution step to be processed therein when the
black and white pixel data does not match one of
the first irregularity detection patterns, and said
5  image-quality correction step is used to process
the input black and white pixel data by
interrupting processing being performed in said
pixel-distribution step when the black and white
pixel data matches one of the first irregularity
10  detection patterns.

        20.  A printer for performing correction to
improve the quality of images represented by input
binary black and for printing the images,
comprising:

15        a scale-varying processor unit for varying
the size of an original image optically scanned to
a predetermined image size by performing pixel-
removal processing;

        a binary unit for converting the size-varied
20  image into black and white pixel data according to
an error-variance method; and

        an image-quality corrector unit for detecting
irregular patterns that are represented by data
included in the black and white pixel data and that
25  are specific to an error-variance method, wherein
said image-quality corrector unit detects at least
one type of substantially vertical vertical-line

irregular patterns caused through the pixel-removal
processing, substantially vertical vertical-edge
irregular patterns, substantially horizontal
horizontal-line irregular patterns, substantially
5    horizontal horizontal-edge irregular patterns; and
thin-line patchy patterns to thereby smooth the
detected patterns. to thereby smooth the detected
patterns.

    21.    The printer according to claim 20,
10   wherein said scale-varying processor unit magnifies
the size of the original image to a predetermined
image size according to pixel-interpolation, and
then reduces the magnified image size to the
predetermined image size by performing the pixel-
15   removal processing.

    22.    The printer according to claim 20,
wherein said scale-varying processor unit detects a
gradient variation of a pixel-removal-candidate
attention pixel with respect to peripheral pixels,
20   does not perform pixel-removal processing when the
gradient variation is relatively great, and
performs pixel-removal processing when the gradient
variations are relatively small.

    23.    The printer according to claim 20,
25   wherein said scale-varying processor unit defines a
matrix having a predetermined size for a pixel-
removal-candidate attention pixel, calculates the

sum of absolute values representing the difference
between the pixel-removal-candidate attention pixel
and peripheral pixels belonging to the matrix as a
gradient variation amount, does not perform the
5    pixel-removal processing when the gradient
variation amount is equal to or greater than a
predetermined threshold, and performs pixel-removal
processing when the gradient variation amount is
less than the threshold.

10       24.   The printer according to claim 20,
wherein said scale-varying processor unit does not
perform remove a removal-candidate pixel either
when the level of the removal-candidate pixel is
bright, and the overall tone of peripheral pixels
15   thereof is dark; or when the level of the removal-
candidate pixel is dark, and the overall tone of
peripheral pixels thereof is bright.

         25.   The printer according to claim 20,
wherein said image-quality corrector unit inputs
20   the black and white pixel data representing groups
of an attention pixel and a plurality of peripheral
pixels, and performs comparison of the input data
to the irregular patterns registered; and when
pattern-matching is detected, said image-quality
25   corrector unit performs area gradation correction
for converting an area at a predetermined position
in an n-divisional pixel (n = natural number) of

the attention pixel and a predetermined number of
intrapixel divisional areas to black areas.